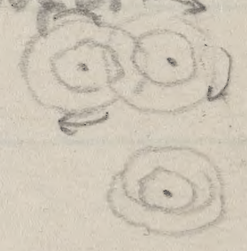
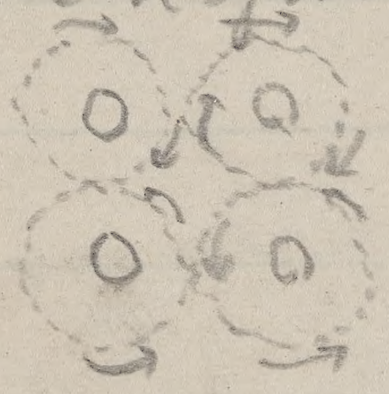
[Since $H = \frac{2Cr}{a^2}$ inside a coil we know Circular magnetisation with iron and L with copper. This assumes Current on surface only penetrating inwards. It be uniformly true only distributed there can be no H inside]

OH.. commences with two assumptions that inside $H \propto \frac{2Cr}{a^2}$ outside $\propto \frac{2C}{r}$. He offers no proof. [Ency p 436 ult: a contradictory] He also commences by calling magnetic force B (¶ 200) - ~~MAGNETISING~~ $C = 4\pi \times$ coil H

In a long Solenoidal coil of one layer. If current per unit length is C H outside is nil inside it is uniformly $4\pi C$ + 11 layers →



[Take a flux tube Heat flux]



When a vector B is related to another vector C so that the line integral of B around any closed curve equals the integral of C through the curve C is the Curl of B. Thus $4\pi C$ = curl H ~~MAGN~~

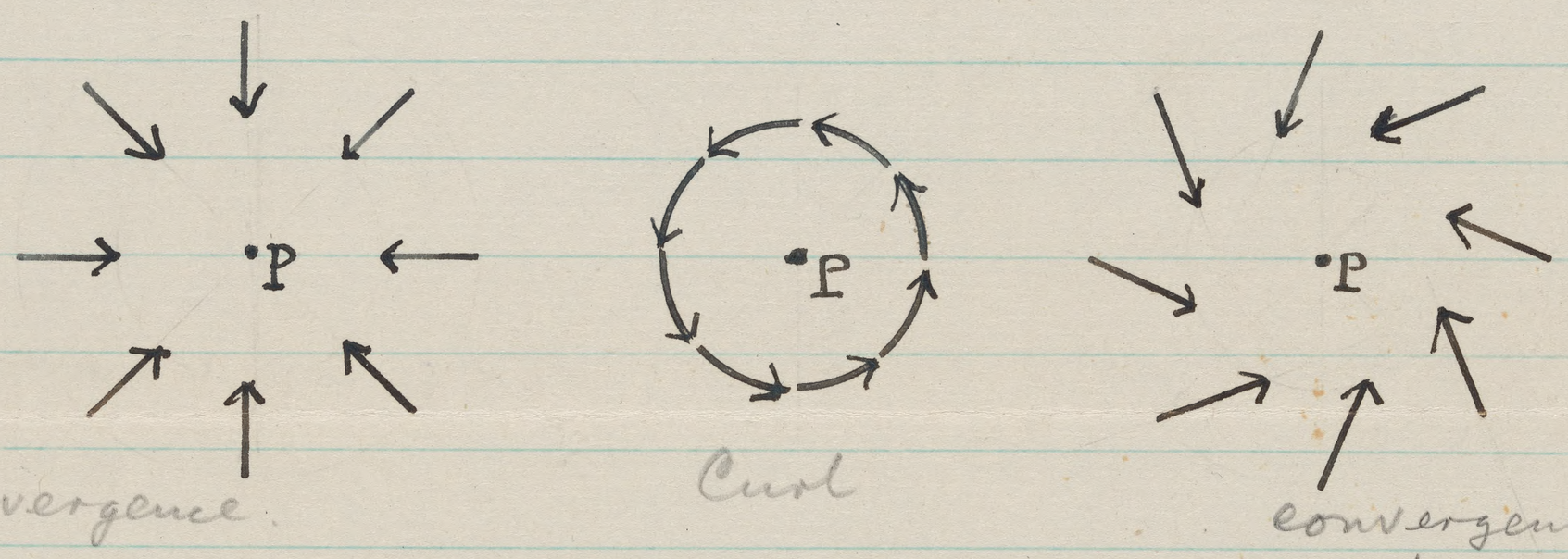
EXTRACT FROM MAXWELL'S PAPER

"On the Mathematical Classification of Physical Quantities"

(Maxwell's Scientific Papers, Vol. II p 265. Proc. of London Math. Soc. Vol. III No. 34 pp 224-232, 1871 read 1871, 03.09)

If σ represent a vector function, ∇σ may contain both a scalar and a vector part which may be written S∇σ and V∇σ. I propose to call the scalar part the Convergence of σ. .... But ∇σ has, in general, also a vector portion, and I propose, but with great diffidence, to call this the Curl or Version of the original vector function.

It represents the direction and magnitude of the rotation of the subject matter carried by the vector σ. I have sought for a word which shall neither, like Rotation, Whirl, or Twirl, connote motion, nor like Twist, indicate a helical or screw structure which is not of the nature of a vector at all.



If we subtract from the general value of the vector function σ its value σ_0 at the point P, then the remaining vector $\sigma - \sigma_0$ will, when there is pure convergence, point towards P. When there is pure curl, it will point tangentially round P; and when there is both convergence and curl, it will point in a spiral manner.

The following statements are true:—

The slope of a scalar function has no curl.

The curl of a vector function has no convergence.

The Convergence of the slope of a scalar function is its Concentration.

The concentration of a vector function is the slope of its convergence, together with the curl of its curl

The second and third diagrams given above differ from those in Maxwell's Electricity and Magnetism, Vol. I, p. 30 (Art. 25). The Index gives "Curl, Art. 25", but Curl does not appear in that Article.

G. F. C. Searle
9 Nov. 1949

ISD

Prof. Tait.

Proceedings of the Roy. Soc. of Edinburgh
April 28, 1862,
and the most complete on "Green's and
other allied Theorems." Trans. Roy. Soc. of Edinburgh
1869-70.

AUTHOR SEARLE, G.F.C. MS

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DEPARTMENT OF PHYSICS AND ASTRONOMY

September 9, 1968

Mr. Bern Dibner, Director
Burndy Library
Electra Ave.
Norwalk, Connecticut
06852

Dear Mr. Dibner:

I have enclosed two short notes by the late Dr. G. F. C. Searle, a professor of physics at the Cavendish Laboratory, Cambridge University. As you probably know, he was Heaviside's closest personal friend, and he also collaborated with Heaviside on a number of important problems in electromagnetic theory and the properties of electrons. He had an outstanding reputation as a teacher of physics at Cambridge University, and he was a Fellow of the Royal Society. As it is his relationship to Heaviside that is important in the history of science, I suggest that these notes belong in your Heaviside file.

In your letter of 28 August a list of the Burndy publications was enclosed, and you asked me to select an item that I might not have. I already have most of the items that are still in print, and I have enjoyed reading them. In fact, in a number of cases I have reread reread them again with interest. I do not have your "The New Rays of Prof. Rontgen", and I should be very pleased to have a copy.

With very best wishes,

Sincerely yours,

B. R. Gossick

B. R. Gossick

Professor of Physics and Electrical Engineering

M.5

Notes made by Dr. G. F. C. Searle, physics faculty Cambridge University,

given to B. R. Gossick by H. J. Josephs.

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